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REMARKS

This paper is responsive to the Office Action dated May 25, 2005. Claims 21-55 were examined.

Rejections under 35 U.S.C. §102

Claims 21-55 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,168,564 issued to Barlow (hereinafter "Barlow"). Applicant traverses all rejections. To reject the claims, the Examiner relies heavily on inherency and supports the conclusions of inherency with factual assertions that are not supported by Barlow. Although the Examiner supplies citations to Barlow, there is no nexus between the inherency proclamations by the Examiner and these citations.

"To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.' " In re Robertson, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999). MPEP 2112.

The Examiner establishes inherency in a manner completely contrary to the legal requirements for establishing inherency. The assertions of inherency do not necessarily flow from Barlow, and do not even rise to the level of probabilities or possibilities. Applicant requests that the Examiner give a fair and reasonable examination that allows development of clear issues for appeal.

Independent claims 21, 32, and 45 – Barlow fails to disclose or suggest determining whether a hazard exists and locking prior to such determining

The Examiner states that

locking is speculative because the system speculates that a hazard will exist (in the future) among first and second RMW operations, and therefore, it must lock the resource speculatively (ahead of time) in order to fix any hazard that may occur down the road. It may turnout, however, that locking has nothing to do with a hazard, but instead, with fixing a malfunctioning lock mechanism, which is done

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by locking a resource and then canceling read/write processing associated with that resource.

The Examiner's statement that Barlow discloses an instruction for fixing a malfunctioning locking mechanism has some basis in Barlow. However, the remaining statements are based solely on the Examiner's assumptions and have no support in Barlow. Barlow discloses a system with processors competing for resources, and a locking mechanism to prevent competing processors from intervening during a RMW operation. However, the Examiner inserts additional assumptions to allow mischaracterization of Barlow's system as a system that performs speculative locking. The Examiner asserts that the locking disclosed in Barlow can be characterized as speculative, because the system speculates that a hazard will occur. This characterization has no basis in Barlow. Applicant requests identification of the section of Barlow that supports the Examiner's assertion that Barlow locks a resource based on speculation that a hazard may occur with the resource.

Claim 21 recites "speculatively locking a resource to be accessed by execution of a first instruction, wherein the locking is performed prior to determining whether a hazard exists between the access and execution of a second instruction." Claim 32 recites "at least one processing core to speculatively lock a resource ... prior to determining whether a hazard exists" and claim 45 recites "means for locking the resource prior to determining whether the hazard exists." To reject these claims, the Examiner refers to Barlow and states that

"if a second processing unit should attempt to access the same [locked] memory location...the memory subsystem will send a busy signal indicating that the memory location is in use." That is, a second operation may not access the same location but if it does, a hazard exists (a second operation is trying to read a location before it is correctly modified by the first operation), and the hazard is fixed by the locking of the resource that occurred when the first operation was first encountered (speculative locking).

It is clear from this quoted section of the Final Rejection that the Examiner contorts the actual disclosure of Barlow and inserts assumptions to arrive at Applicant's claims. Applicant requests that the Examiner identify the section of Barlow that supports the Examiner's definition of a hazard. Applicant also requests that the Examiner identify the section of Barlow that discloses determining whether a hazard exists as recited in claims 21, 32, and 45. Scouring of the sections

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cited by the Examiner produces nothing more than disclosure of locking and a cancel command to override the read/write portions of instructions. The Examiner states that RAW hazards are inherently part of Barlow. The rationale for this statement is that locking and unlocking of resources is specifically useful in preventing RAW hazards. Applicant requests that the Examiner identify the section of Barlow that supports the assertion that locking and unlocking is specifically useful in preventing RAW hazards. Since Barlow does not disclose or suggest determining hazards, Barlow cannot disclose or suggest performing locking prior to determining hazards, and especially cannot disclose or suggest speculatively locking prior to determining existence of hazards.

Independent claim 42 – Barlow fails to disclose or suggest speculative dispatch of a load operation

Claim 42 recites a “processor adapted to speculatively dispatch a load operation to a cache unit prior to determining whether read-after-write hazards associated with the load operation are present.” In rejecting claim 42, the Examiner states that a “lock indicator, or mechanism can be canceled after it is set once it is determined that the command using the resource that is locked is invalid, therefore the resource is being locked before the command has been determined to have hazards, and before the command is known to go until completion.” The Examiner also states that since Barlow has disclosed a read portion of a RMW operation, then Barlow discloses a load operation. The Examiner never addresses the actual limitations of claim 42. The Examiner has not identified any disclosure or suggestion for speculatively dispatching a load operation, and especially speculatively dispatching a load operation prior to determination of whether RAW hazards exist. As stated above, Barlow fails to disclose or suggest determining whether hazards exists, and especially fails to disclose or suggests determining whether RAW hazards exist.

Examiner assumes limitations without support from Barlow and improperly asserts inherency

Claims 22, 34, and 46

To maintain the rejections, the Examiner states that

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a trap stage could be any stage within the processing of an instruction in which a fault is fixed. Clearly, if a resource is already locked, and it needs to be unlocked (column 9, lines 35 – 36), then the locking is performed before the error is fixed in a "trap stage".

Column 9, lines 35 – 36 recite "[a]ssuming that the lock should have been reset and was instead set, a write lock reset command is issued." Hence, the Examiner rejects these claims based on an assertion that a limitation of a trap stage means nothing to the Examiner. With this assertion, the Examiner effectively rewrites the claims. Applicant requests that the Examiner examine the pending claims as they are written, and that the Examiner either identify the section of Barlow that supports the assertion that a trap stage is at any time or identify the section of Barlow that discloses or suggests locking a resource prior to a first instruction entering a trap stage of a pipeline.

Claims 23, 35, and 47

In the previous response, Applicant informed the Examiner that Barlow specifically discloses that a RMW operation is implemented with two separate instructions, a read set lock command and a write reset lock command. See column 8, line 9 – column 9, line 41. Barlow also specifically states that a *sequence of instructions* specifies a read-modify-write operation. See column 1, lines 42 – 46. Barlow fails to disclose or suggest an atomic instruction with a portion to lock and a portion to unlock. In response to the Applicant's contentions, the Examiner states that

[a] read-modify-write operation is a common operation that is viewed as being an "instruction," as it the operation itself instructs the system to perform something. It is further viewed as an instruction because the read, modify, and write portions are performed atomically. i.e., they are not interrupted. So, there is in fact a read portion, which locks a resource, and a write portion, which unlocks a resource (column 1, lines 53 – 57), and these portions are atomically performed to ultimately instruct the system to perform a "read-modify-write" operation.

Despite the RMW operation being disclosed as 2 separate instructions, the Examiner simply concludes that a RMW operation can be viewed as an instruction. Applicant requests identification of support for this assertion by the Examiner. The Examiner then characterizes the

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Examiner's newly created RMW "instruction" is atomic. Applicant requests identification of support for all of the assertion that Barlow discloses an atomic RMW instruction.

Claims 24, 36, and 49

As stated above with respect to claims 21, 32, and 45, the Examiner states that RAW hazards are inherently part of Barlow.

The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (reversed rejection because inherency was based on what would result due to optimization of conditions, not what was necessarily present in the prior art); In re Oelrich, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). MPEP 2112.

The rationale for this statement is that locking and unlocking of resources is specifically useful in preventing RAW hazards. Applicant requests that the Examiner identify the section of Barlow that supports the assertion that locking and unlocking is specifically useful in preventing RAW hazards. Applicant also requests that the Examiner explain how RAW hazards are necessarily present in Barlow to support the assertion of inherency. Applicant notes that RAW hazards are determined when instructions are speculatively dispatched so that instructions can be executed out-of-order.

In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art. MPEP 2112 quoting Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original).

Claims 25, 37, and 49

The Examiner again relies on inherency to support rejection of claims 25, 37, and 49. In response to Applicant's remarks, the Examiner states that

Clearly, before a resource is locked, its location/address must be determined. The process of determining which resource to lock and then locking it is part of an "effective address calculation stage" of the pipeline.

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Since the Examiner cannot find support to reject the claims, the Examiner relies on an assertion of inherency. The Examiner states that locking must be performed during an effective address calculation stage. Applicant requests identification of the section of Barlow that discloses impossibility of locking subsequent to an effective address calculation stage, and the necessity of locking a resource during its effective address calculation stage.

Claims 28, 40, 44 and 52

Barlow does not disclose or suggest “unlocking the resource no later than a time at which the first instruction exits an instruction pipeline, regardless of whether the first instruction is cancelled” as recited in claim 28, and similarly in claims 40, 44, and 52. Again, the Examiner asserts that these limitations are inherent. The Examiner states that “if an instruction specifies unlocking, then unlocking is part of processing the instruction, and therefore, the unlocking will have to occur before the instruction leaves the pipeline (completes).” The Examiner has again examined only a portion of the claim limitations. The Examiner fails to address the entire claim, which includes recitation of “regardless of whether the first instruction is cancelled.” Barlow fails to disclose or suggest the limitations of the claims, and the Applicant requests that the Examiner identify the section of Barlow that discloses or suggests the claims in their entirety and not just limitations selected by the Examiner.

Claim 43

Claim 43 recites “wherein the processor is adapted to lock a resource associated with the load operation concurrently with dispatching the load operation.” The rejection of claim 43 relies on the rationale that a “lock indicator, or mechanism can be canceled after it is set once it is determined that the command using the resource that is locked is invalid, therefore the resource is being locked before the command has been determined to have hazards, and before the command is known to go until completion.” Applicant cannot determine how this assertion by the Examiner relates to claim 43, since there are not assertions as to concurrency of locking and dispatch. Barlow does not disclose or suggest locking a resource to be accessed by a load operation concurrently with dispatch of the load operation. Moreover, the Examiner fails to address these limitations.

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For at least the reasons above, Barlow does not anticipate any of Applicant's claims.

Conclusion

In summary, claims 21 – 55 are in the case. All claims are believed to be allowable over the art of record, and a Notice of Allowance to that effect is respectfully solicited. Nonetheless, if any issues remain that could be more efficiently handled by telephone, the Examiner is requested to call the undersigned at the number listed below.

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that, on the date shown below, this correspondence is being

- deposited with the US Postal Service with sufficient postage as first class mail and addressed as shown above.
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Steven R. Gilliam

25-Jul-2005

Date

Respectfully submitted,

Steven R. Gilliam, Reg. No. 51,734
Attorney for Applicant(s)
(512) 338-6320 (direct)
(512) 338-6300 (main)
(512) 338-6301 (fax)

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